4. HAZARD-SPECIFIC DISCUSSION

This section of the report discusses the hazards that are present at the INEEL Site as a result of historic operations. Eight hazard areas at the INEEL Site are described in the following sections. A hazard area is a portion of the Site that contains hazards that present risks to human health or the environment (e.g., contaminated soil, entombed facilities, contaminated groundwater plumes, or buried waste). Each section contains general narrative, maps, and conceptual site models that provide additional information about the hazards. The hazards are described as they currently exist (in 2003) and as they are anticipated to exist at the end of the EM cleanup mission. The timeframe for active cleanup is currently anticipated to be 2035, while the timeframe for completion of existing groundwater remediation is 2095. Current mitigation, planned actions, and institutional controls are discussed for each hazard area. In general, the hazard areas correspond to WAGs established in the FFA/CO; however, information on other planned closure activities, such as RCRA closures; VCO activities; and DD&D, is also provided.

Cleanup activities at the hazard areas include removal of radioactive waste and other nuclear materials from the INEEL Site, DD&D of facilities that are no longer needed, RCRA closures of hazardous waste facilities, actions required by the VCO, and CERCLA remedial actions. These activities are discussed in more detail in each of the following hazard area narratives. An overview of VCO and RCRA closure activities is provided below.

The VCO required resolution of a number of self-disclosed RCRA compliance issues, most of which were related to tanks and tank systems. Work to resolve the VCO issues has been in progress for about 3 years. There are still open VCO actions at four INEEL facilities: INTEC, TAN, TRA, and PBF. The open actions include characterization of several tank systems and RCRA closure of those systems where the characterization data confirm that the systems were used to store hazardous waste. The open actions at PBF are expected to be complete by the end of 2004. Actions at TAN will be completed by the end of 2005. Actions at TRA and INTEC will be completed by 2012.

RCRA closures of hazardous waste facilities will be required at INTEC, TAN, TRA, RWMC, and WROC. The RCRA closures at TRA are all related to the VCO actions described above. The RCRA closures at WROC will be complete by the end of 2004. The RCRA closures at TAN are scheduled to be complete by the end of 2006. INTEC will require numerous RCRA closures, the last of which (calcine storage bins) will not be complete until 2035. The Advanced Mixed Waste Treatment Facility at RWMC will require RCRA closure after operations have been completed. Specifics on these activities are detailed in RCRA closure plans, which require approval from the State of Idaho.

The RBESV is based on an assumption of government control of the INEEL. Future land-use assumptions include the following:

- The INEEL will remain under government management and control. Regardless of future use of the land now occupied by the INEEL, the federal government has an obligation to provide adequate institutional controls (e.g., limit access) to areas that pose a significant risk to human health until that risk diminishes to an acceptable level for the intended purpose.

- To the extent practical, new development to support the INEEL mission will be encouraged in developed facility areas to take advantage of existing infrastructures. Such redevelopment will reduce environmental degradation associated with construction activities in previously undeveloped areas.

- No residential or agricultural development will occur within INEEL boundaries. Grazing and other controlled activities, such as use by tribes, will be allowed to continue in the buffer area.

The RBESV is based on the premise that the INEEL Site, as it currently exists, will remain intact for the foreseeable future. Most of the developed areas of the Site will remain industrial areas for the foreseeable future. Likewise, the undeveloped areas, which constitute the majority of the Site, will continue to be used as a buffer area and for ecological and cultural preservation, environmental research, and controlled grazing and hunting. Land use at the INEEL at the end of the EM cleanup mission is expected to be much the same as the current land use, with the exception that DOE's EM operations will be completed, and responsibility for operations and long-term stewardship will be transferred to the LPSO, currently DOE's NE Office. NE operations at the risk-based end state are not discussed in this document.

Typically, CERCLA risk assessments for the INEEL have been based on both current and future land-use scenarios. The CERCLA human health risk assessments quantified potential carcinogenic (cancer-causing) and noncarcinogenic adverse health effects. Despite an assumption of long-term industrial use at the INEEL, many of the earlier CERCLA baseline risk assessments were conducted using a hypothetical residential scenario. In general, the hypothetical residential scenarios assumed continued institutional controls for 100 years, after which a resident might occupy a contaminated site and engage in subsistence farming. The residential scenarios were consistent with EPA guidance and modeled a person living on the Site 350 days a year for 30 years, beginning 100 years from a baseline date. The baseline dates varied from one ROD to another. Some were based on the 1995 land-use planning decisions; others were based on the year that the RI/FS or ROD was signed. It was assumed that future residents would construct 10-ft basements beneath their homes. Therefore, they could be exposed to contaminants through spreading of the excavated materials around the perimeter of the house.

The assessments also examined the potential risk to current and future workers and to ecological receptors. The occupational scenarios modeled nonintrusive industrial use (i.e., disturbances to 4 ft below ground surface) without restrictions. The current occupational scenario that was analyzed lasts 25 years from the present. The future occupational scenarios started 100 years from the baseline date and last 25 years. These conservative scenarios were believed to allow for all impacts of any potential future land use.

Remedial action objectives (RAOs) were developed in accordance with the National Contingency Plan and CERCLA RI/FS guidance. RAOs specify contaminants and media of concern, potential exposure pathways, and remediation goals. RAOs are specific risk criteria that take into consideration the assumed future land uses at the INEEL. RAOs are developed for specific media (i.e., soil, perched water, or groundwater). Applicable RAOs for a particular site or group of sites depend on the specific media involved.

To meet the RAOs, remediation goals are established. Remediation goals establish acceptable exposure levels that are protective of human health and the environment. These goals generally are quantitative cleanup levels based upon human health and the environment and are based upon the results of a baseline risk assessment and evaluation of anticipated exposures and risks for selected remedial alternatives. A 1×10^{-4} (1 in 10,000) cumulative carcinogenic risk or cumulative hazard index of 1 for noncarcinogenic contaminants, whichever was more restrictive for a given contaminant, was the primary basis for determining remediation goals for release sites. Remediation goals for contaminated soil are based on soil concentrations that satisfy the 1×10^{-4}-carcinogenic-risk goal or noncarcinogenic hazard index of 1 for current workers, future workers, and residents. Risk-based remediation goals are used to

verify the effectiveness of the selected remedial action and to determine if additional remedial action is necessary before closing a particular release site.

Conceptual site models provide, in block diagram form, information regarding the hazards, pathways, receptors, and barriers (current and planned) between the hazards and receptors. The conceptual site models, which were prepared during baseline risk assessments and published in approved CERCLA documents, have been updated to reflect current (2003) conditions and modified to show anticipated conditions at the end state. Since the CERCLA baseline risk assessments evaluated risk to hypothetical residential receptors, the conceptual site models in this document include residential receptors. However, there is no current residential use of the INEEL Site, and no future residential use will be allowed. The public is protected from hazards by restricted access to the Site. Workers are protected by a combination of administrative procedures, restricted access, and other controls.

The eight hazard areas are as follows:

- Section 4.1—Sitewide Soil and Groundwater
- Section 4.2—Test Area North
- Section 4.3—Idaho Nuclear Technology and Engineering Center
- Section 4.4—Radioactive Waste Management Complex
- Section 4.5—Central Facilities Area
- Section 4.6—Waste Reduction Operations Complex, Power Burst Facility, and Auxiliary Reactor Area
- Section 4.7—Test Reactor Area
- Section 4.8—Argonne National Laboratory-West.